

Trial release area: The end of Whangaparaoa Peninsula makes an ideal area for a trial release as it is already visited by Bellbirds. In Shakespear Regional Park and the adjacent Armed Services land, there is 30-40 ha of mature forest plus at least three times this in scrub. This forest has a far greater diversity of nectar sources than Tiritiri and the recent plantings by the Auckland Regional Authority has extended this diversity (Table 1). A release of 10 males and 12 females was made into this area in March 1983. All birds were colour banded and joined at least two unbanded males that had moved to the area the year before. Subsequent checks have shown that many birds are still alive and that some pairs seem localised in particular areas. Regular monitoring is planned to determine the success of this re-establishment and supplementary releases are planned.

Effect of removal: Will removal of birds from other areas deplete these populations? Close monitoring of one forest patch on Tiritiri Island has shown very little turnover of adult birds. Of the resident pairs, many of the birds present in 1977 were still present in 1980. Four of the more dominant males were still dominant in 1981 with the two most dominant males having been present since 1975. Thus there appears to be a slow turnover of adults and most of the 2-4 chicks raised per pair annually disappear. Removal of birds in February-March, when the number of juveniles is high, is therefore not likely to reduce spring densities.

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CHICK FEEDING AND ATTENDANCE IN THE WHITE TERN

Holyoak & Thibault (1976) suggested that the frequency of chick feeding in the White Tern (*Gygis alba*) required study because, whereas they observed feeding at all times of the day in French Polynesia, Dorward (1963) observed it only at dusk on Ascension. On 17 December 1979 at Norfolk Island I saw chicks 5-15 days old fed throughout the day.

Two of the chicks were on horizontal branches of Norfolk Island pines (*Araucaria heterophylla*) and one was on a horizontal section of the trunk of a white oak (*Lagunaria patersonia*). They were on branches of 8-25 cm diameter, 6-20 m above ground (19-33 m a.s.l.) and 5-15 m from the shore. Their feeding behaviour and their parents' associated behaviour were recorded from sunrise to 15 minutes after sunset.

Chick one received 12 feeding visits, lasting 1-109 min (average 20). As one to six fish were delivered on each of eight trips (average 3.1), the chick was fed an estimated 37 fish for the day. It was left alone for periods of 21-92 min (average 44). Observations on the second chick were continuous only until 1200 h, by which time it had been fed twice. One visit lasted 180 min, the longest of any observed and the period between visits was 7 min, the shortest of any observed. The third chick was visited nine times (possibly ten), providing 24-27 fish for the day. The feeding parent remained from one-half to 15 min and left the chick alone for periods of 10-20 min.

Chick behaviour during parent absence, apart from moving along the branch, was limited to one period of wing flapping and a rapid head shake in one chick and one period of gaping in chick three, during a period of exposure to direct sunlight.

Feeding behaviour was as follows. Parents sometimes circled before landing and sometimes flew straight in to the chick. Either way the chick would watch its parent approach and land, then move up to it with head lowered and bill upturned in a begging posture. The fish would be taken one at a time from their crosswise position in the parent's bill (see Fig. 1) and swallowed. Once, when a fish was dropped on to the branch, it was retrieved by the parent and fed to the chick. Judging from the number of fish on the ground below nests, fish dropped to the ground are seldom retrieved.

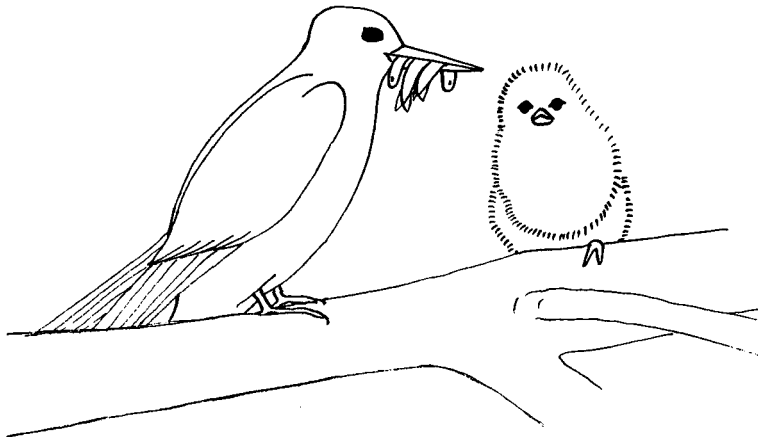


FIGURE 1

Calls made by an approaching parent were heard only twice, bringing an alert standing response with gaping bill from the chick. No calls were heard from the chicks either during feeding or when alone. The same was found on Ascension Island and was normal in French Polynesia. However, Holyoak & Thibault (1976) reported hearing a feeble but distinct cry attracting a chick's parent to its hunger. Thibault proposed that this lack of feeding calls and the presence of protective coloration in the chick for its first 3 weeks both serve against predator detection. There are no bird or mammal predators on many of the islands on which this bird breeds. However, on Norfolk, feral cats take numbers of older chicks and adults, leaving their wings over much of the island. In addition, the Australian Kestrel (*Falco cenchroides*), which became resident on Norfolk in 1978, has been seen to take chicks from the branches (Owen Evans, pers. comm.). The future will judge whether the chicks' camouflage through cryptic coloration, survival without a nest, and practice of not defaecating on its roost will be sufficiently adaptive to enable it to cope with these predators.

After feeding, begging and bill jabbing by the chick were common and seemed on several occasions to hasten the parents' departure out to sea. Once, a parent encouraged bill jabbing from its chick by holding its own bill in front of the chick before settling over it.

Adult preening varied. In the first pair, one parent did not preen and its mate preened only once. The preening ceased when the chick nudged up close causing the parent to sit over it. The second pair engaged in a moment's allopreening at sunrise and, although such behaviour may strengthen the pair bond, it was the only preening by this pair. The third pair, however, preened more often. The first sequence started with preening of the chest, followed by axillaries, secondaries, wing coverts, primaries, wing coverts, uropygium (oil gland), primaries, wing coverts, and uropygium and concluded with wing coverts. This sequence started at 0543 h and also concluded when the bird sat over the chick, at 0552 h. This parent or its mate started a second preening sequence at 1457 h and continued until 1524 h. It was similar to the former but began by a head shake and concluded by placing its bill behind its wing to sleep. However, the chick nudged under one side, causing the parent to move. The chick and parent repeated this for 2 min, before the parent obtained half a minute's "sleep." The chick again took the parent's attention, to the point of receiving a jab back. This allowed the parent to gain 1 minute's sleep with head under wing. This last sequence was repeated several times over another 7 min, before the parent flew out to sea. Further observations need to be made to determine whether chick nudging precedes brooding more often than it precedes departure on a fishing trip.

Another difference between these birds and those on Ascension relates to courtship flights. Dorward (1963) said that there seemed to be no courtship flights with fish at Ascension, although he quotes Ashmole as having seen courtship feeding on Christmas Island (Pacific).

On Norfolk the sight of pairs pursuing nuptial flights to heights of 400-500 m was common in December of 1978 and 1979.

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THE AGE OF KERGUELEN PETRELS FOUND IN NEW ZEALAND

In 1981 occurred the greatest number of Kerguelen Petrels (*Pterodroma brevirostris*) so far recorded in one year in New Zealand (Reed 1981, Powlesland, in press). As usual, most were cast on to North Island west coast beaches in August-September. Reed (1981) examined 26 corpses and found that all but one would be considered adult, aged by the fused ends of the tibiae (unfused in young birds) but that only one male and no females had enlarged gonads. I examined six, of which five showed very uniform plumage with no moult, the other having a mixture of new (grey) and old (brownish) wing coverts, from which I concluded that only the last was more than 1 year old. Moult, other than of the quills, is a protracted process in this group of petrels and so, at the beginning of the breeding season, and notably in species with grey plumage (which browns with wear), birds over 1 year old rarely have that very uniform plumage typical of first-year birds.

The breeding biology of Kerguelen Petrels has been most studied on Possession and East Islands in the Crozet group (Mougin 1969, Despin *et al.* 1972). The breeding birds return for courtship and mating in late August-early September, often spending the daytime in burrows. Activity gradually diminishes towards the prelaying exodus in late September. Laying takes place about 10 October, within a period of days rather than weeks. Although the incubation period is of normal length (c.50 days) for a petrel of its size, chick-rearing takes only about 60 days, thereby resembling that of fulmars and prions more than of other petrels. Thus, chicks depart mainly at the end of January. The colonies are not then deserted, however, as adults (of uncertain status but presumed to be initially non-breeders and failed breeders) almost immediately reoccupy burrows in which no chicks have been reared. Visits to all burrows continue intermittently throughout winter, showing that adults are almost sedentary.

As most Kerguelen Petrels are found on New Zealand coasts when the sedentary breeders are occupying burrows over 8000 km to the west, obviously it is birds in their first few years of life that move eastwards during winter. This behaviour is, of course, not confined to Kerguelen Petrels: the winter to early spring occurrences of Salvin's Prions (*Pachyptila salvini*), Narrow-billed Prions (*P. belcheri*), Blue Petrels (*Halobaena caerulea*), Antarctic Fulmars (*Fulmarus glacialis*) and Antarctic Petrels (*Thalassoica antarctica*) are characterised by starving youthful birds with a majority in their first